Linking life and technology to shape the future

CENTRE OF BIOLOGICAL ENGINEERING

SUPER MICROORGANISMOS:
LIMPAM E CUIDAM DO AMBIENTE

CEB - Centre of Biological Engineering

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BACTÉRIAS QUE TRATAM RESÍDUOS E PRODUZEM BIOGÁS

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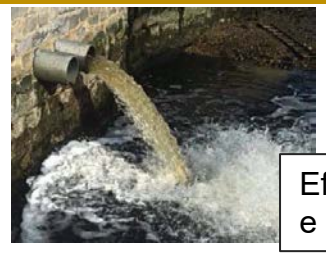
Bactérias que tratam resíduos e produzem Biogás



Efluentes domésticos e industriais

Resíduos agropecuários

Resíduos sólidos orgânicos

Culturas energéticas e biomassa florestal

Microrganismos anaeróbios

Biogás = ENERGIA RENOVÁVEL

CH_4 + CO_2

50 – 75 %

25 – 45 %

Poder calorífico: 20-30 MJ m^{-3}

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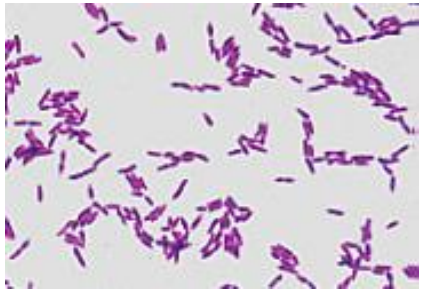
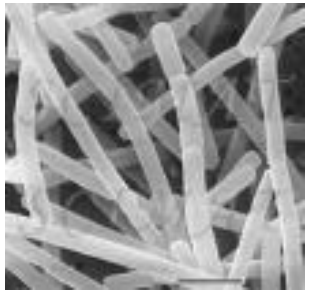
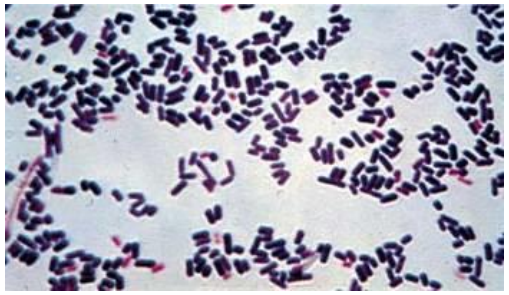
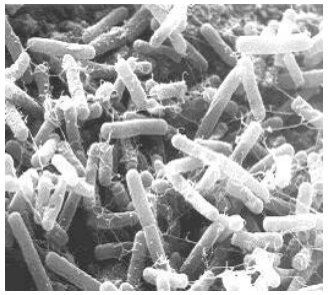
Lactobacillus

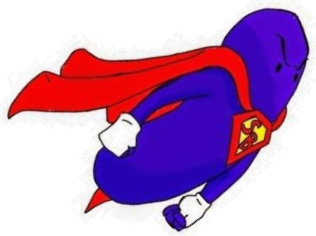




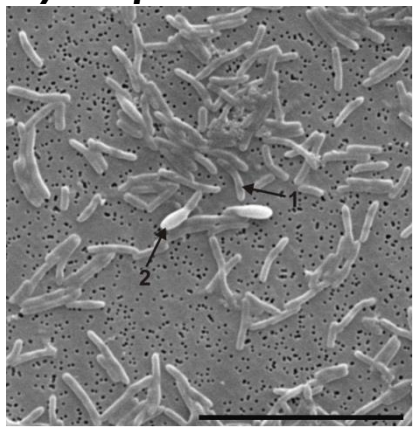
Clostridium



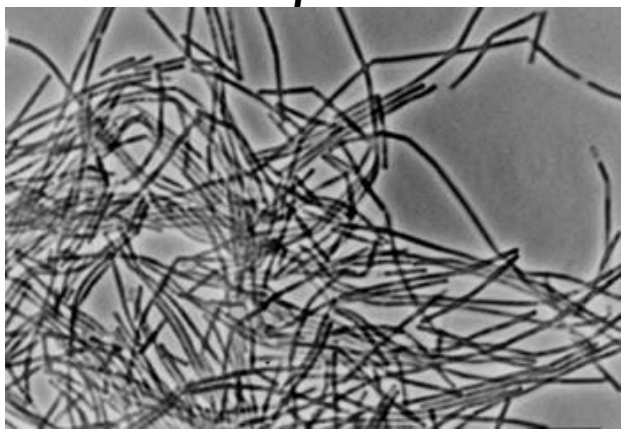




Syntrophomonas zehnderi



Methanosaeta sp.



Methanobacterium thermoautotrophicum

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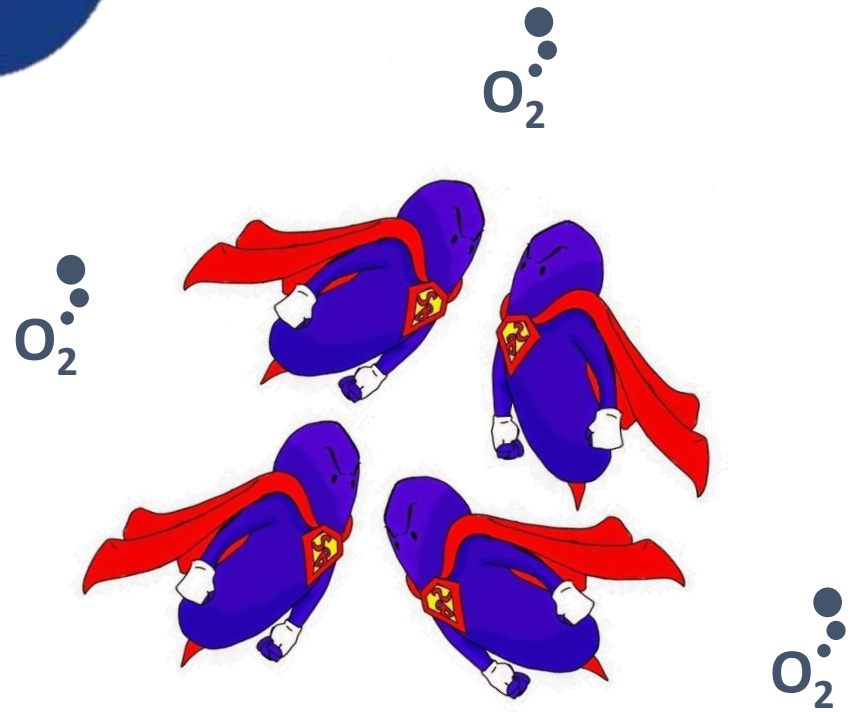

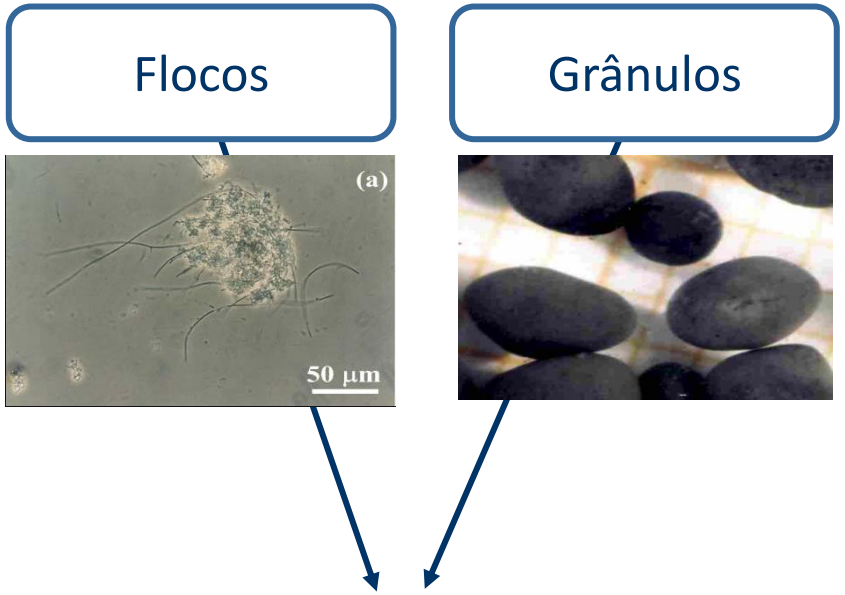

Agregados em suspensão,
sem fixação a suportes sólidos

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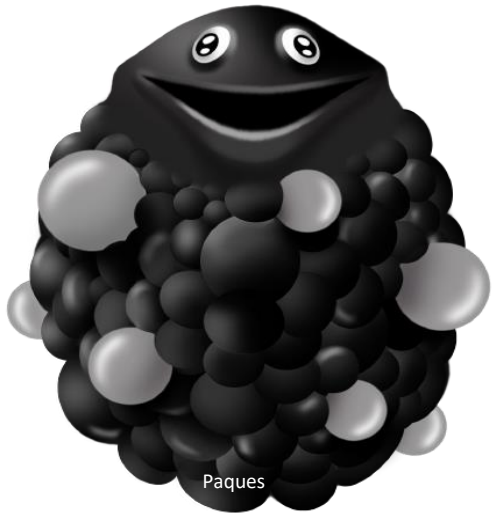

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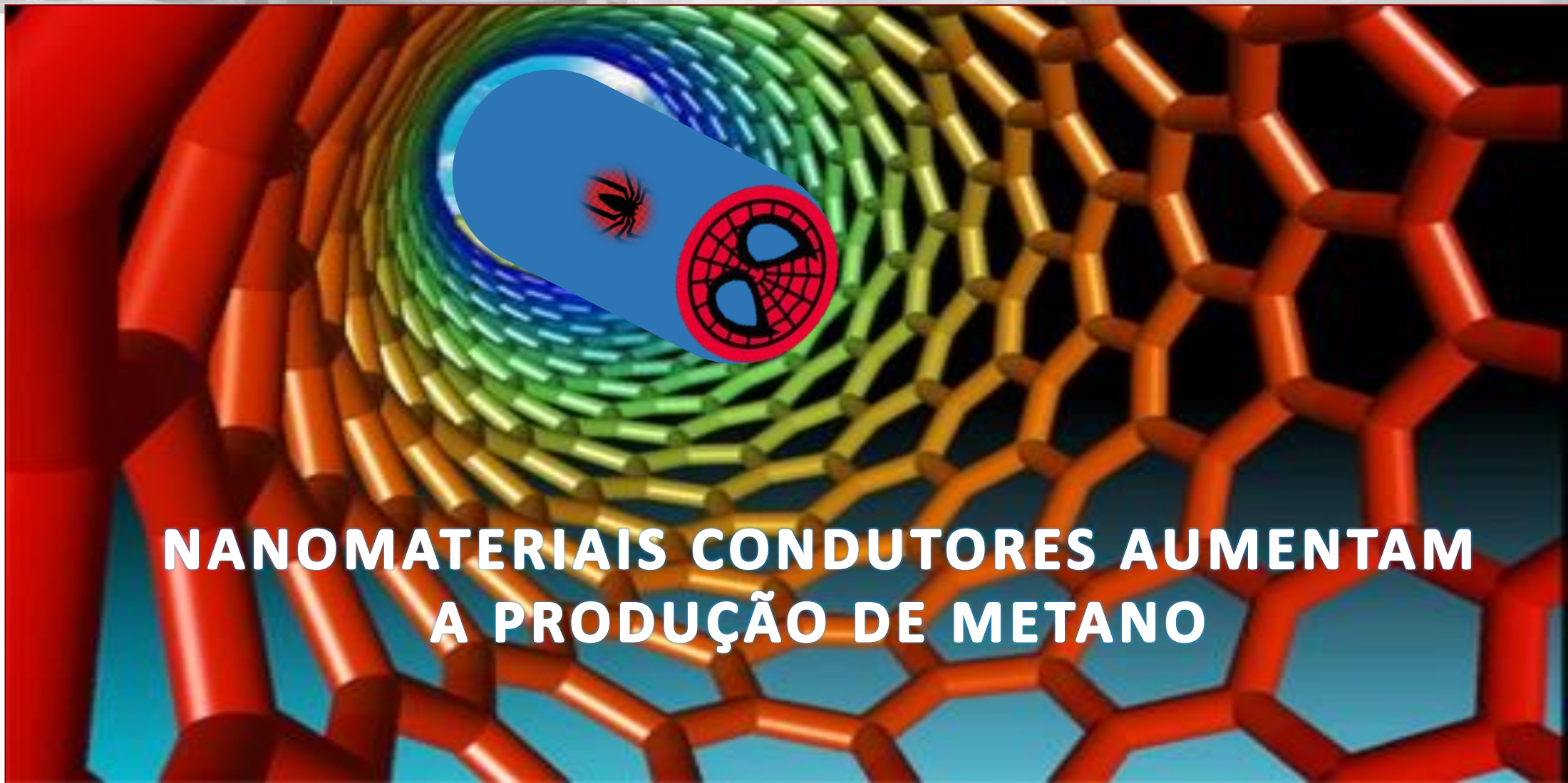

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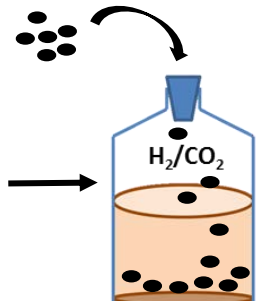
Nanomateriais condutores aumentam a produção de Metano

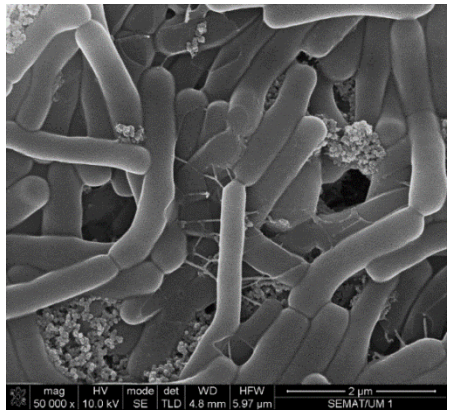
Nanomateriais condutores

Bactérias

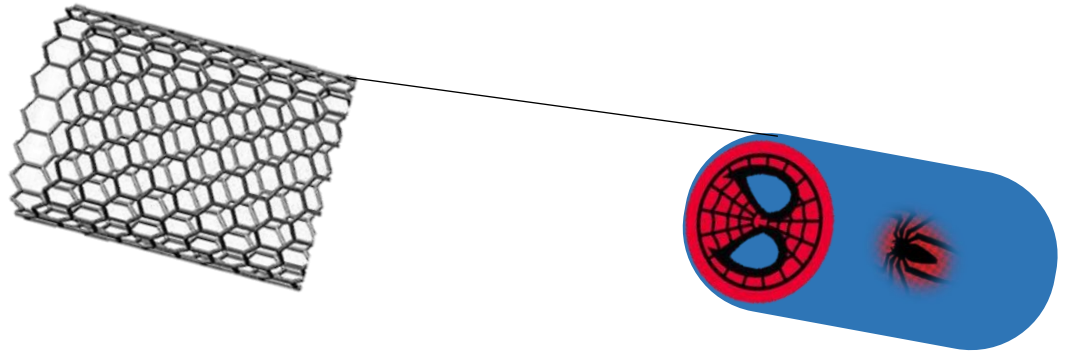


Materiais condutores avaliados

- **Nanotubos de Carbono (CNT)**
- Nanotubos de Carbono com ferro **(CNT@2%Fe)**
- **Activated Carbon (AC)**



Methanobacterium formicicum



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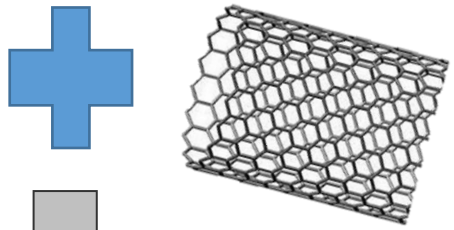
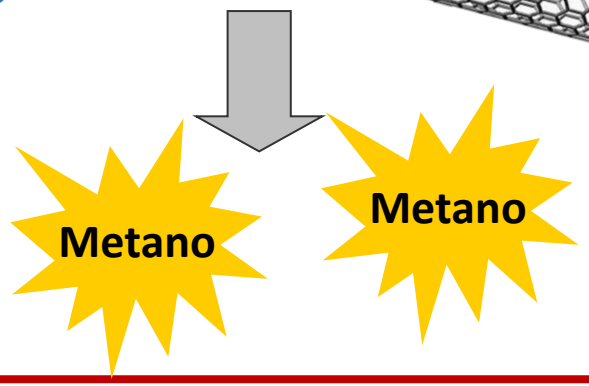
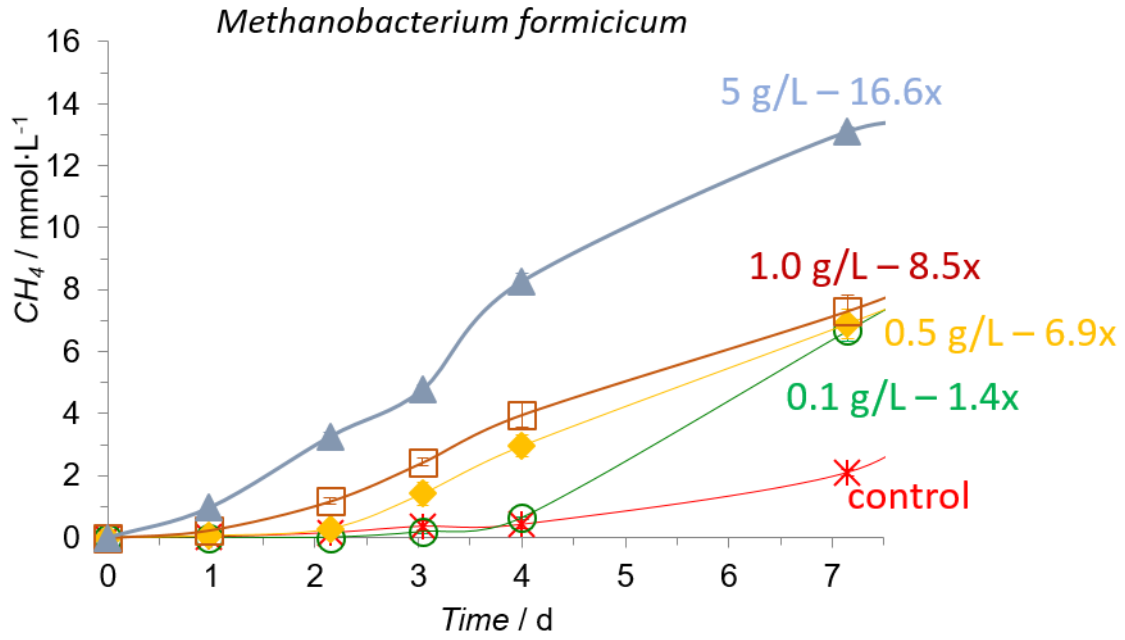




✓ CNT aumentam a produção de Metano



Aumento da produção de Metano relativamente ao controlo

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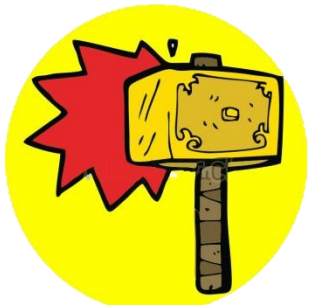

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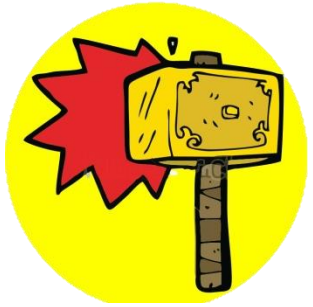
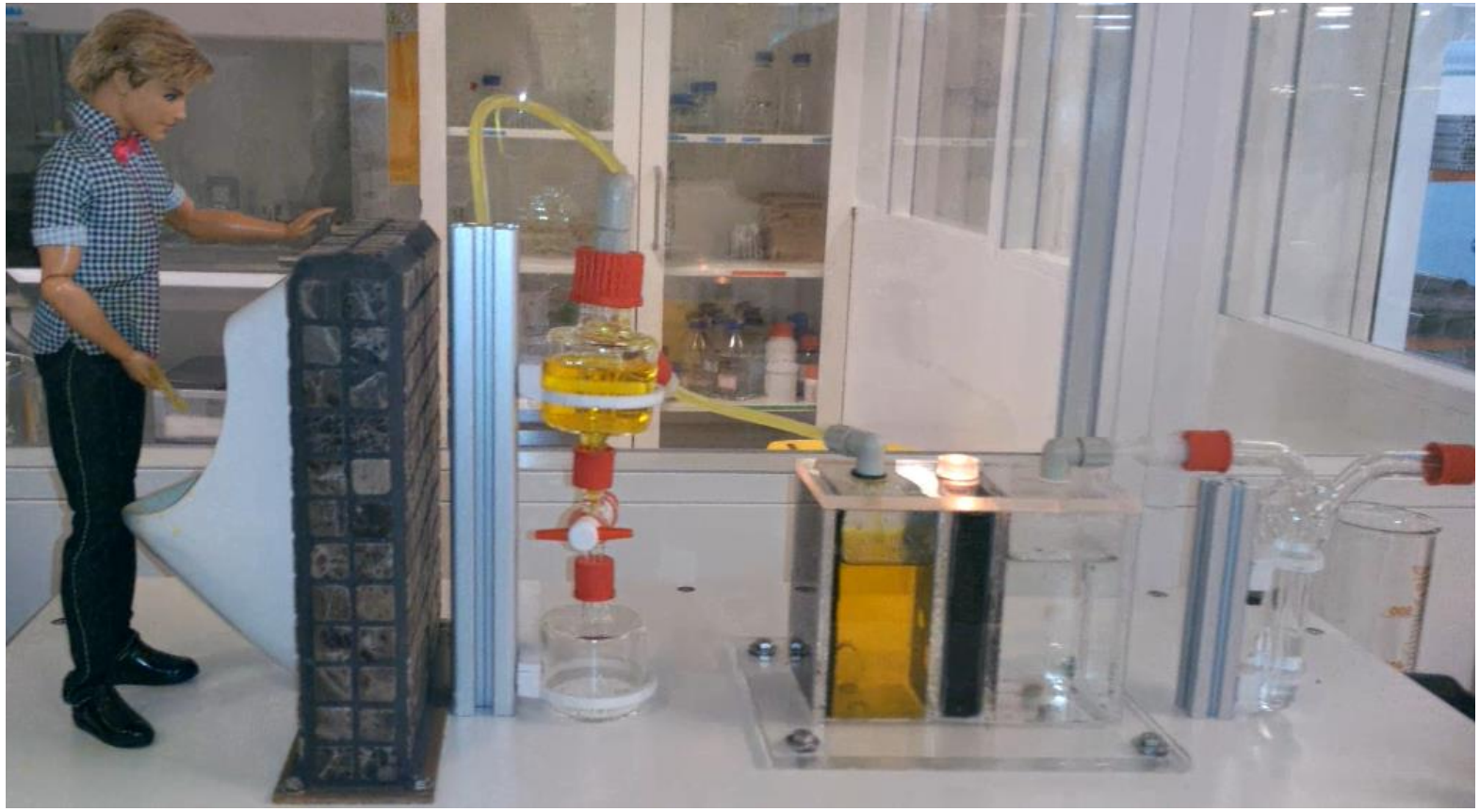


Bactérias que tratam urina e produzem electricidade



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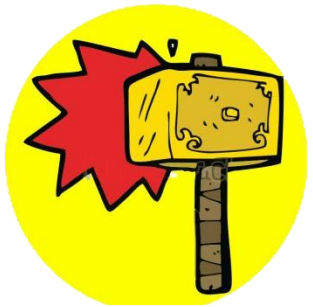
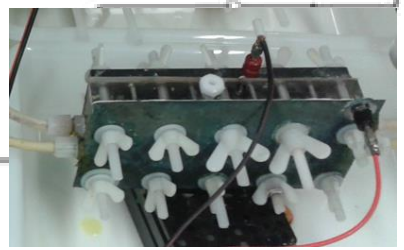


Bactérias que tratam urina e produzem electricidade

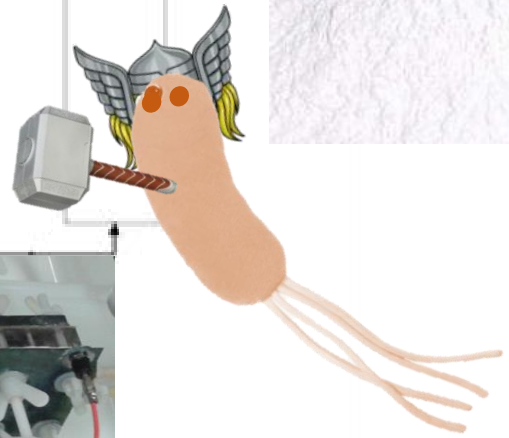
Urina

Estruvite

Electricidade



Azoto



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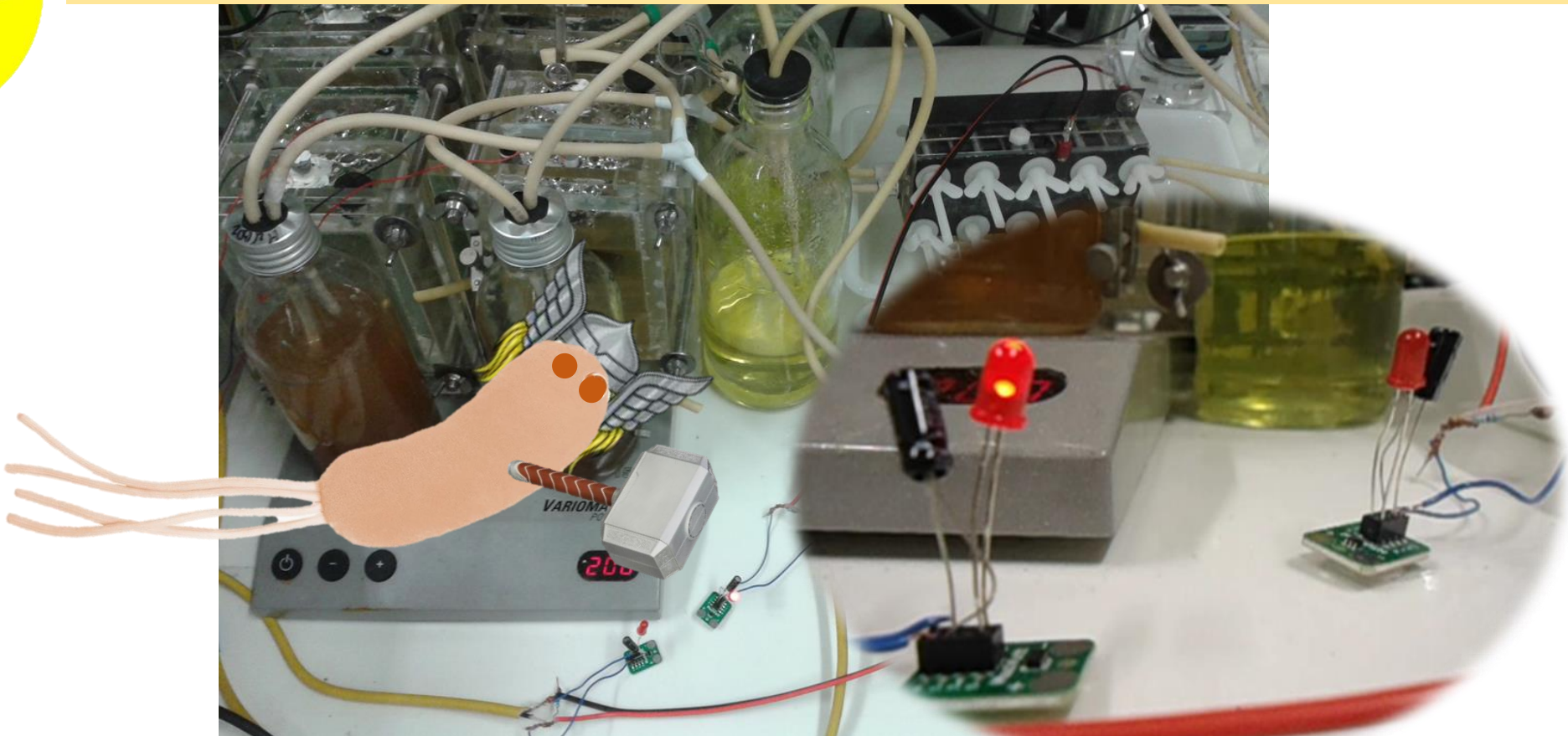

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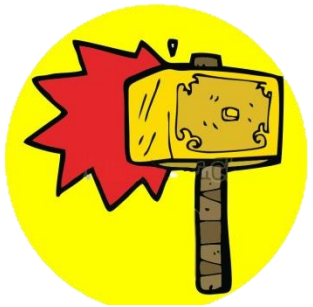

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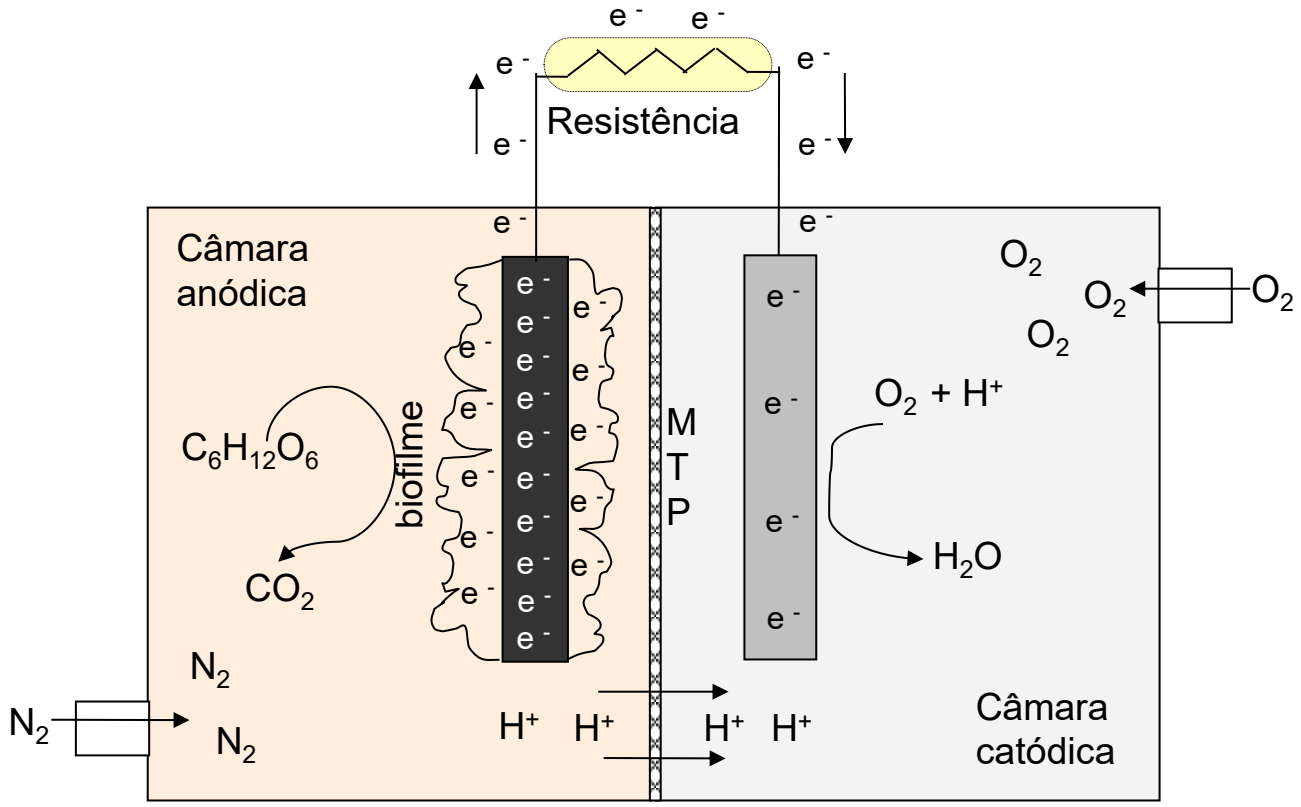

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Bactérias que limpam locais contaminados com petróleo

Golfo do México, 2010

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Bactérias que limpam locais contaminados com petróleo

REMEDIATING CRUDE CITY

May 12, 2010 · by bmilligan · in corporate ecologies, infrastructure, Portland and Cascadia, readings & reviews, restoration & reclamation, urban voids · Leave a comment

[The Infrastructural City blogiscussion – Chapter 3: Crude City]

[Removal of a leaking storage tank from a Superfund site. Image via Massachusetts Department of Environmental Protection photostream]

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BIOREMEDIAÇÃO

Microrganismos

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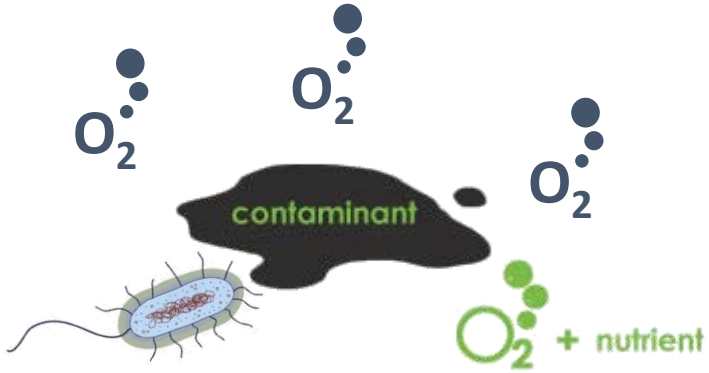
BIOREMEDIAÇÃO



Microrganismos

Bioestimulação

O_2

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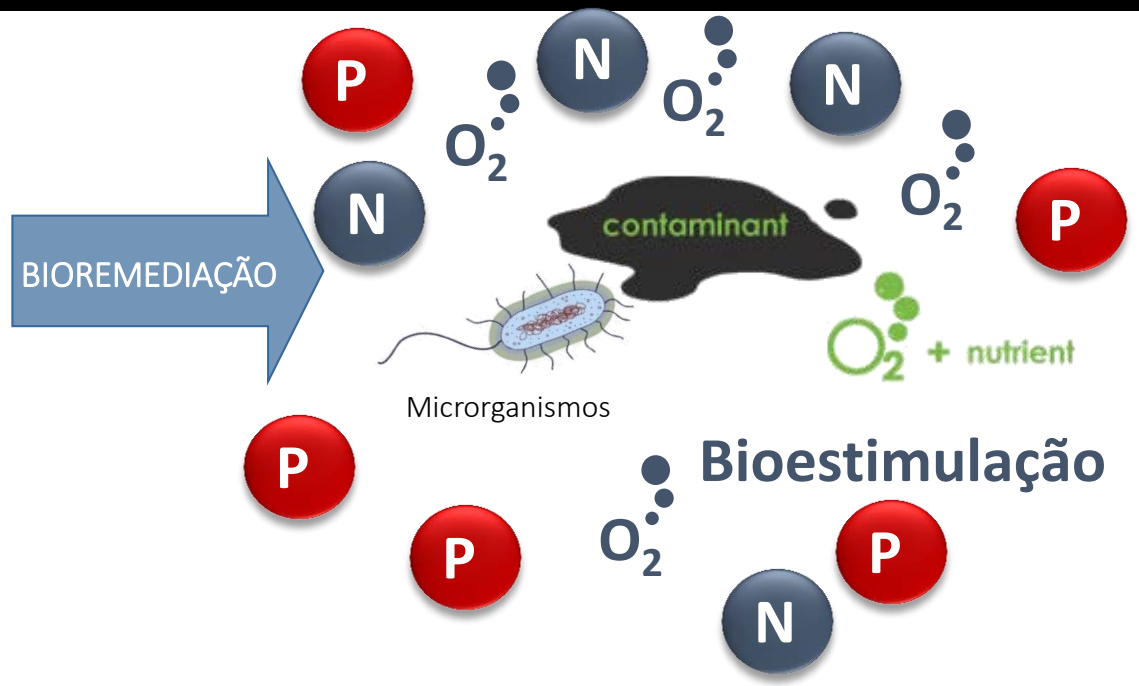

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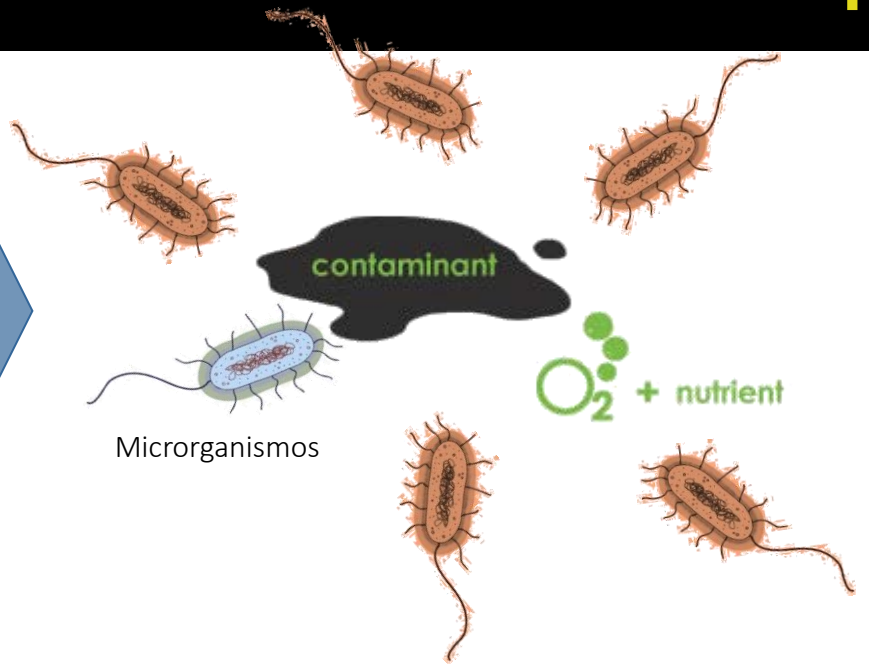

Bioaumentação

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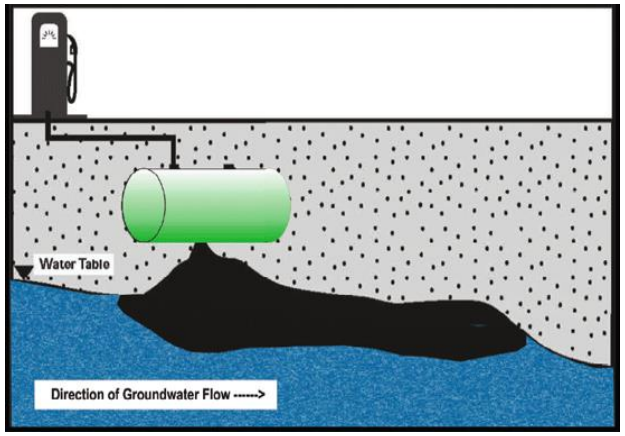
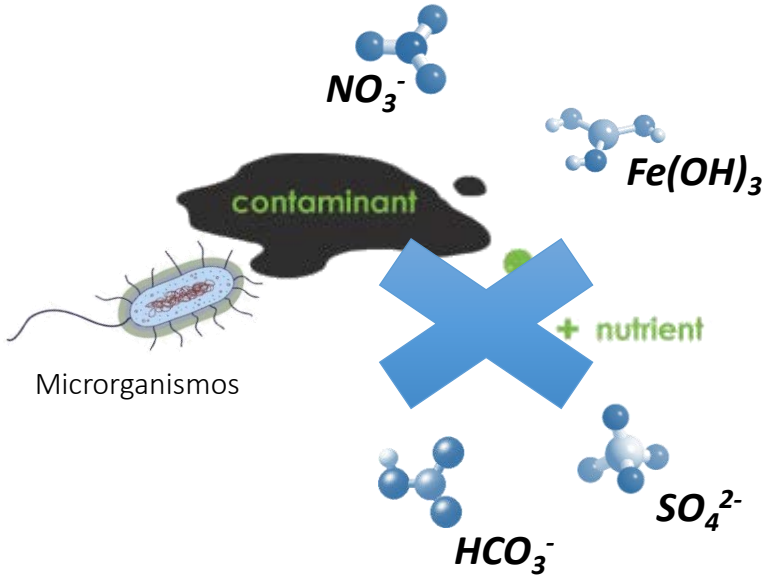


http://www.all-electronic-devices.com

BIOREMEDIAÇÃO



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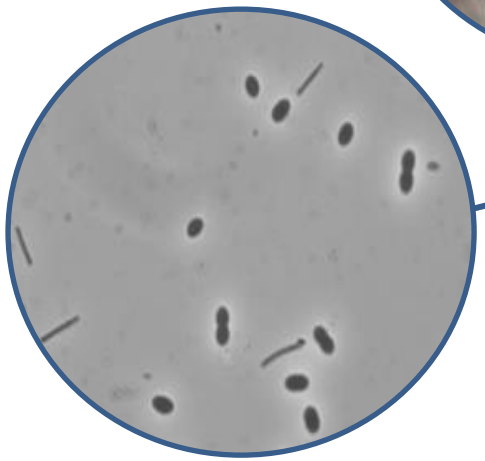

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BACTÉRIAS QUE LIMPAM LOCAIS CONTAMINADOS METAIS PESADOS

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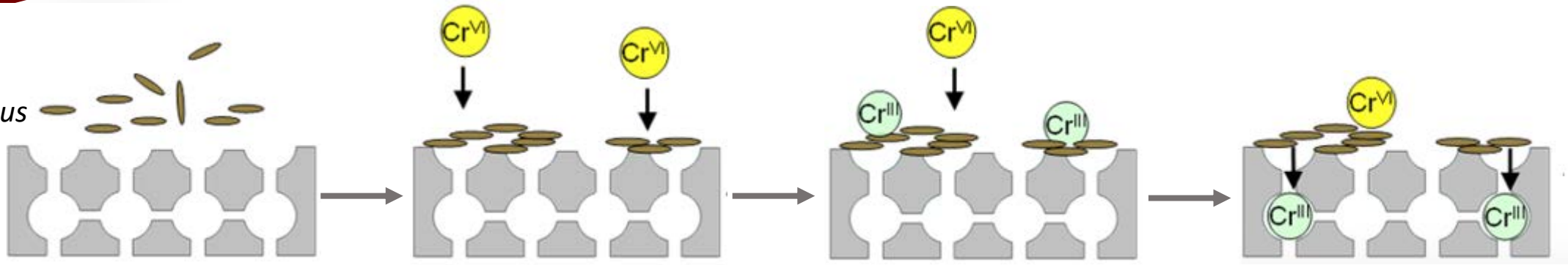
Bactérias que limpam locais contaminados com metais pesados

Bactéria
Arthrobacter viscous

Zeólito



A bactéria transforma o Cr(VI) em Cr(III) que consegue ficar retido dentro do zeólito

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PROTOZOÁRIOS QUE AVALIAM O TRATAMENTO DE ÁGUAS RESIDUAIS

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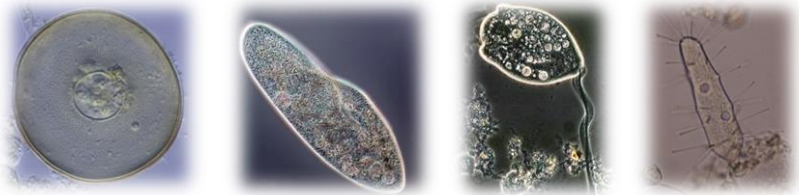
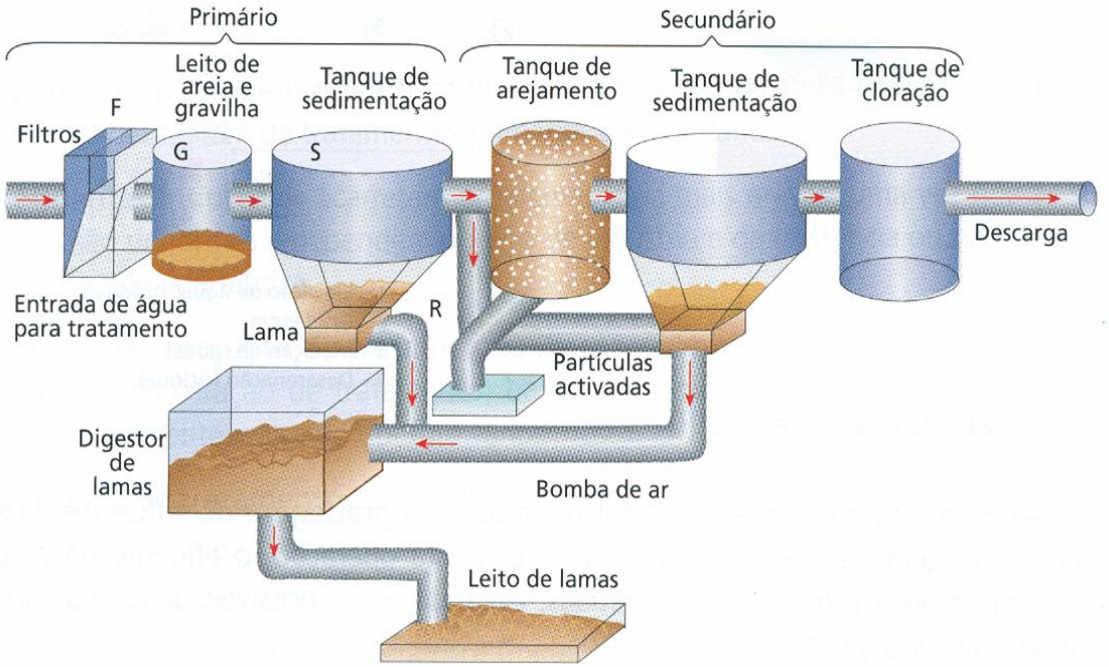
Protozoários que avaliam o tratamento de águas residuais

- Nas **ETARs** os principais organismos envolvidos são as bactérias.
- As bactérias removem a matéria orgânica da água e crescem em **flocos**.
- As bactérias que não crescem em flocos ou que estão fracamente aderidas aos flocos são ingeridas pelos **protozoários**.





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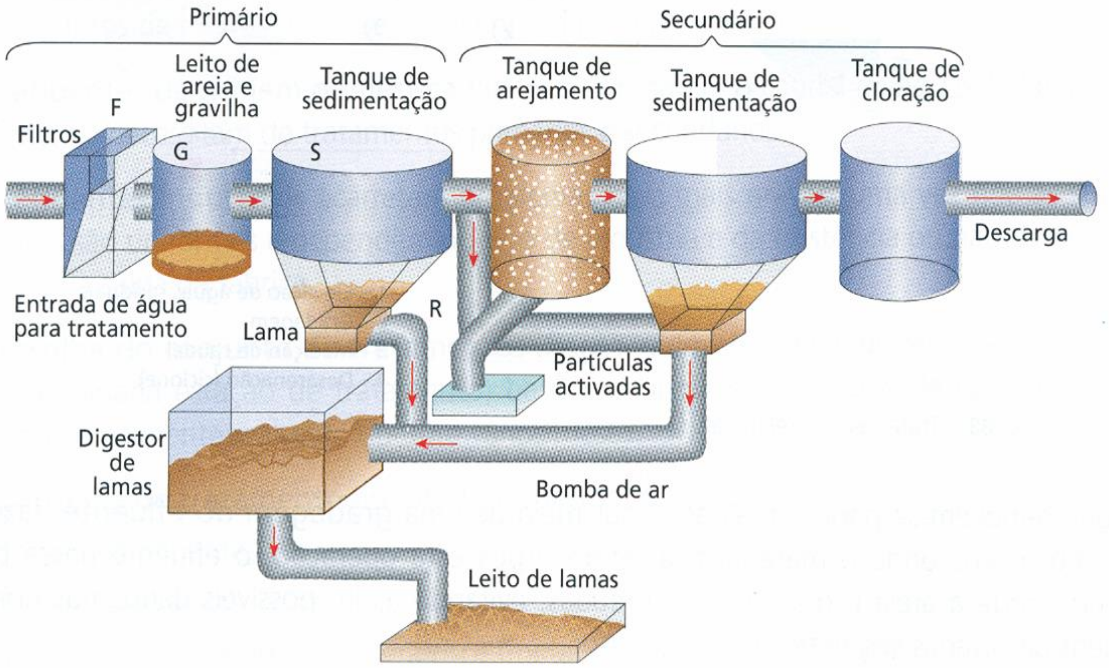
Protozoários que avaliam o tratamento de águas residuais

- Como sabemos que o tratamento é **eficiente**?
- Com diferentes condições, as comunidades de protozoários nas lamas são diferentes:

  - há espécies que indicam **problemas** outras **boa qualidade**



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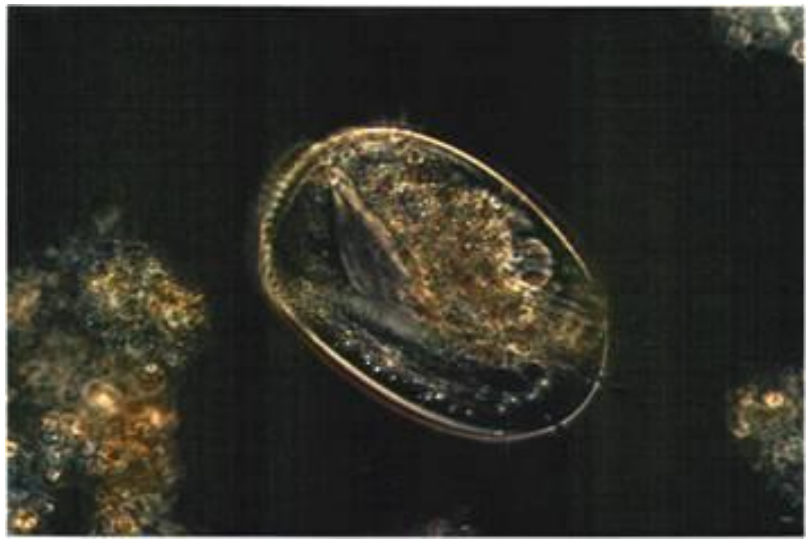
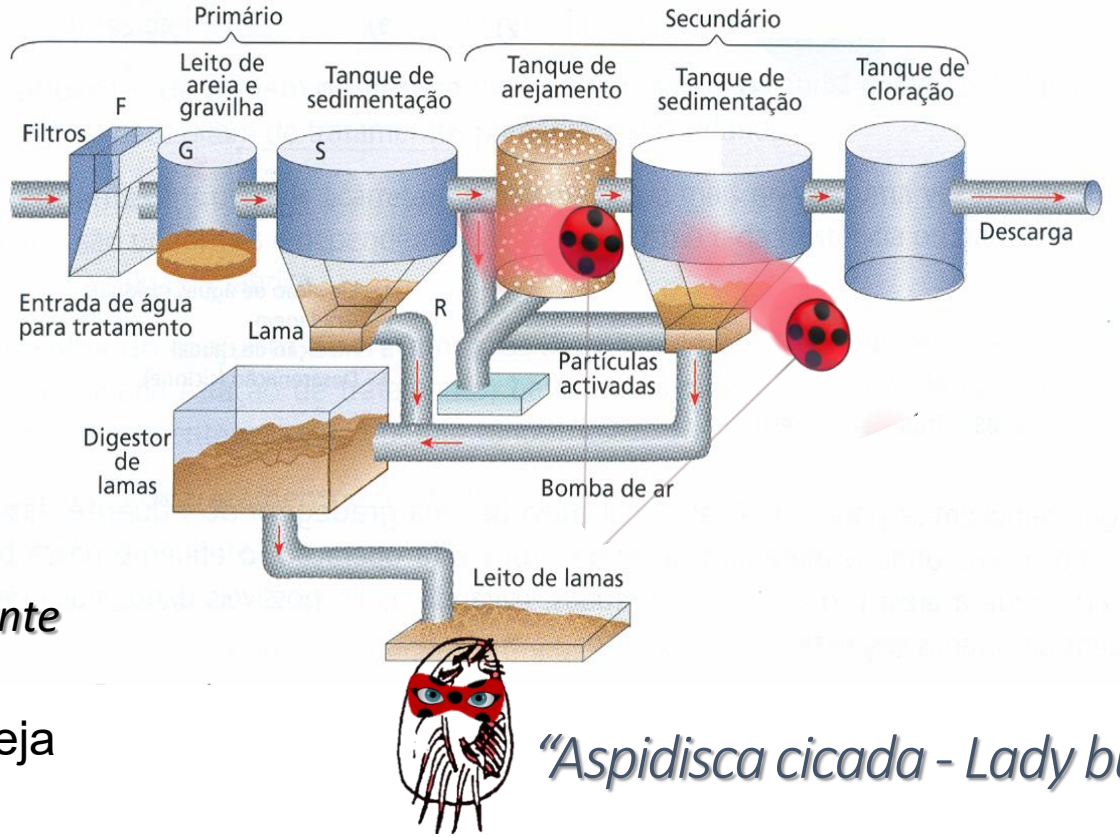


Aspidisca cicada – indicador de processo eficiente



- Se o tratamento for **eficiente** permite que a **água** seja **despejada** nos ecossistemas naturais.

"Aspidisca cicada - Lady bug"

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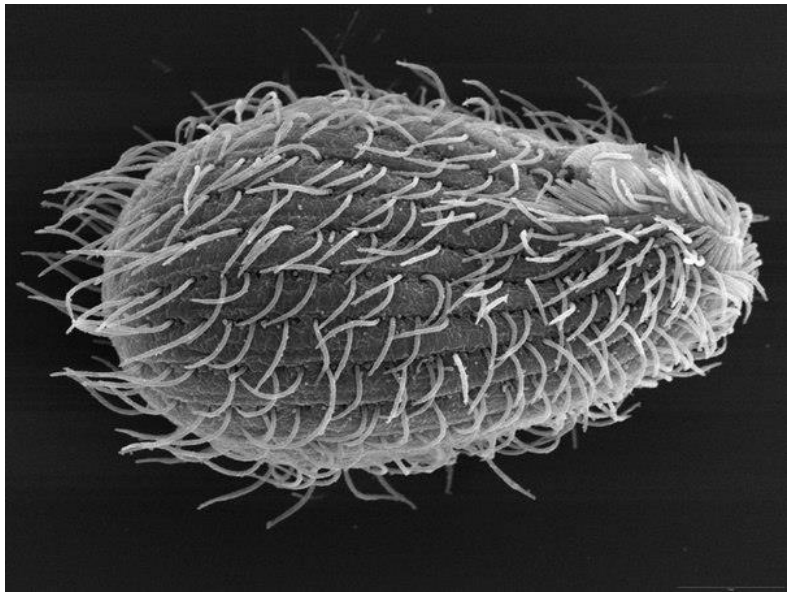
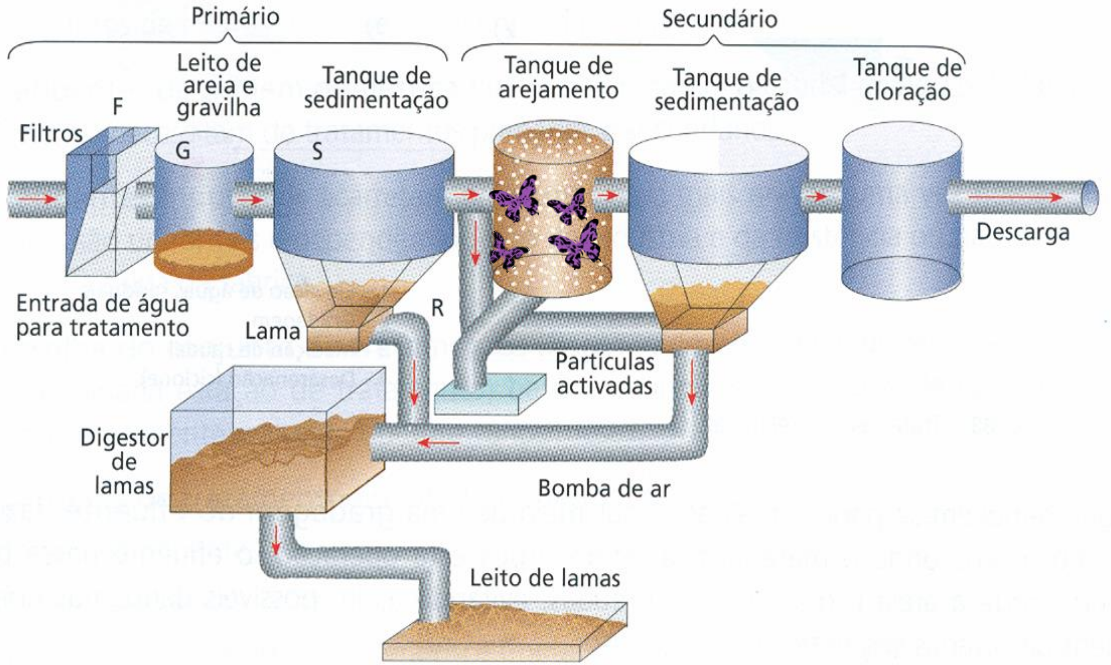


Tetrahymena pyriformis– indicador de processo ineficiente



"Tetrahymena – Falcão traça"

- Se o tratamento for **ineficiente**: presença de compostos **tóxicos** ou falta de oxigénio.

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BACTÉRIAS QUE AVALIAM A TOXICIDADE DE ÁGUAS RESIDUAIS

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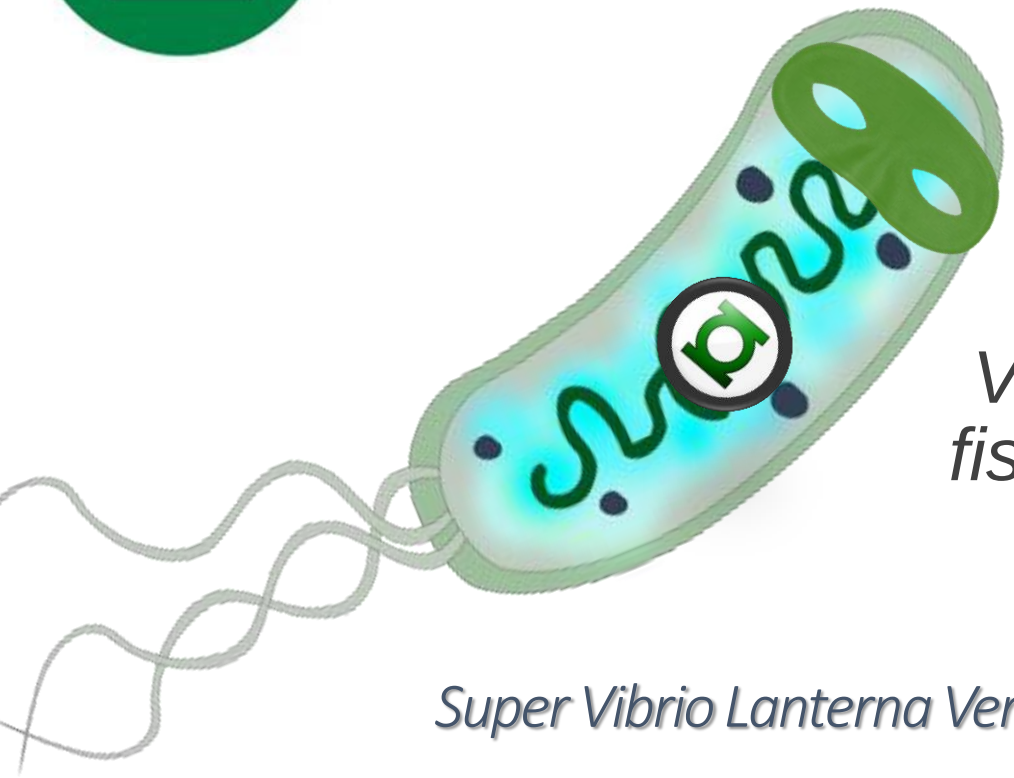
Bactérias que avaliam a toxicidade de águas residuais



Super Vibrio Lanterna Verde

Vibrio fischeri

- Bactéria bioluminescente
- Emissão de luz pela sua atividade metabólica
- Atividade da enzima luciferase

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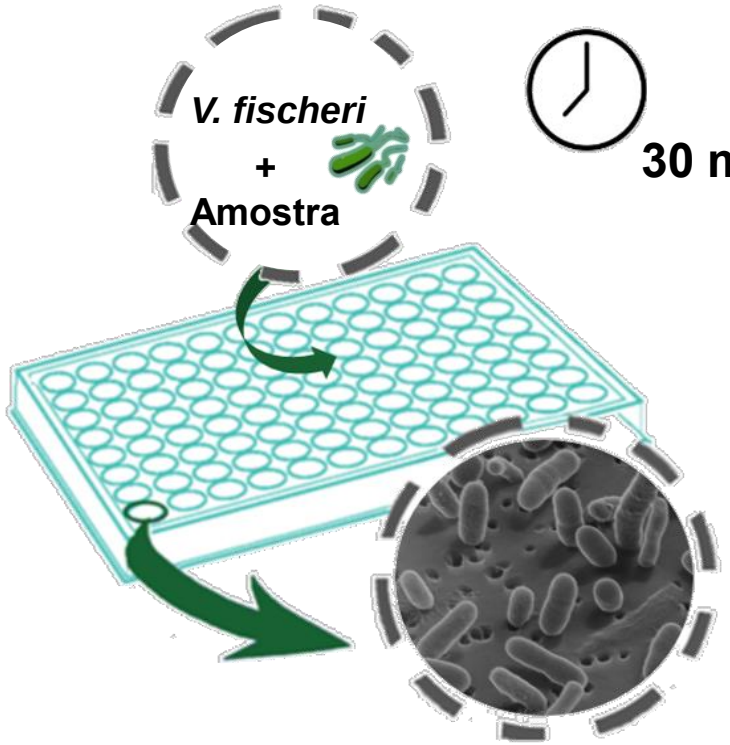

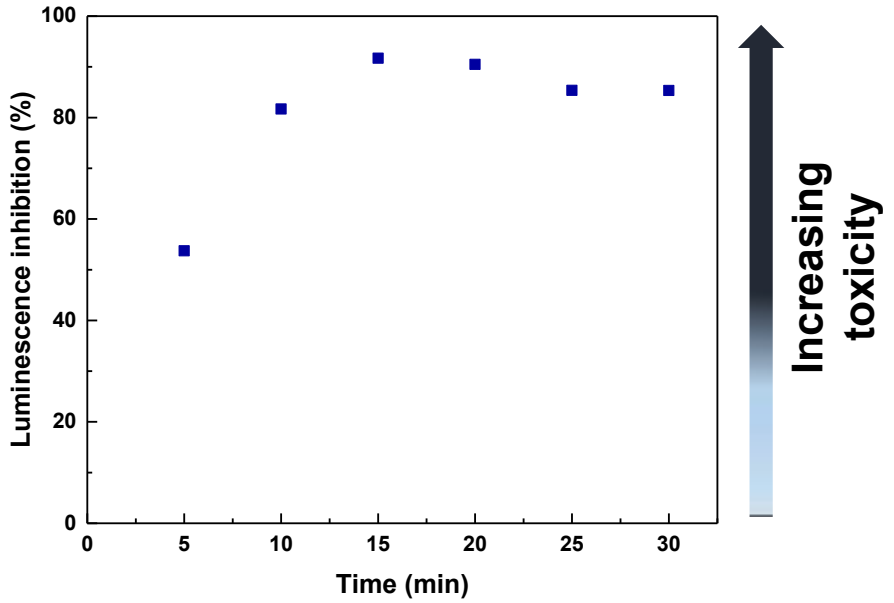

Procedure according to ISO 11348 -1 and 3 (2007)

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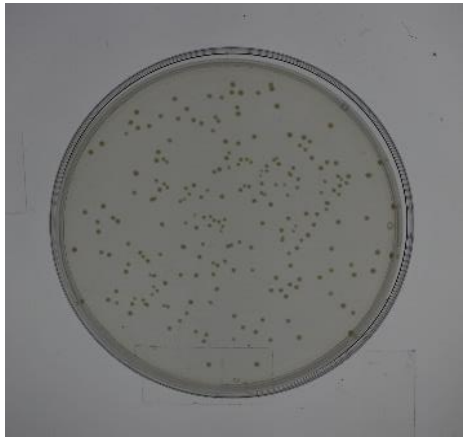
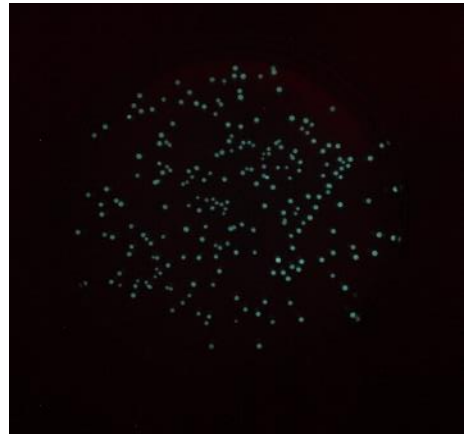
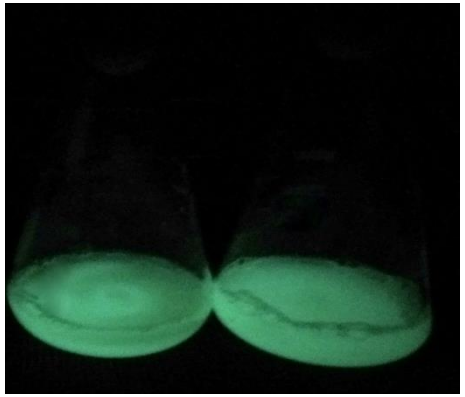
Observação à luz do dia







Observação no escuro

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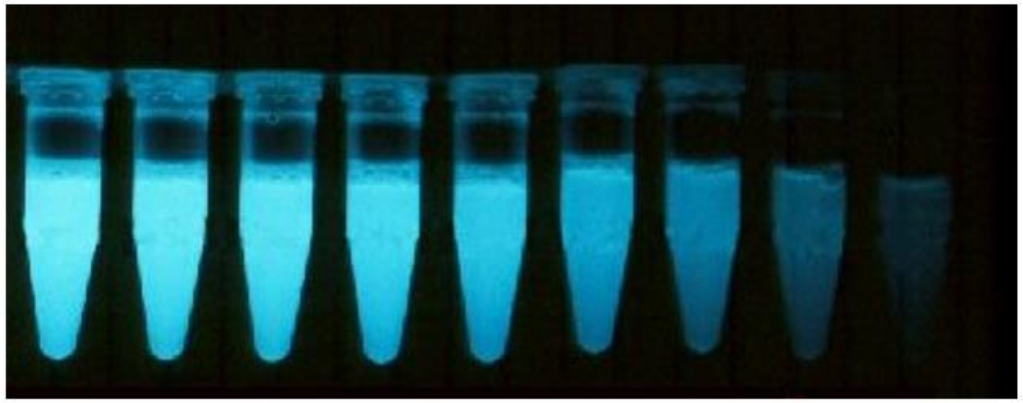
Bactérias que avaliam a toxicidade de águas residuais



http://www.abdn.ac.uk/ims/profiles/l.a.glover

Aumento da Toxicidade

Menos luz mais tóxica a amostra

- **Alta sensibilidade** numa ampla variedade de substâncias tóxicas
- Bioensaio baseado nas **variações da luminescência** quando a bacteria é exposta a substâncias tóxicas
- A **redução da luz emitida** está relacionada com a **toxicidade** da substância testada

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Novos supermicroorganismos

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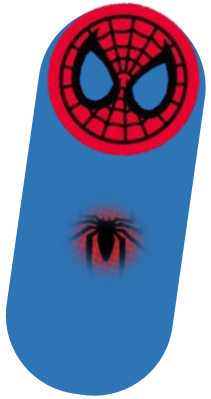
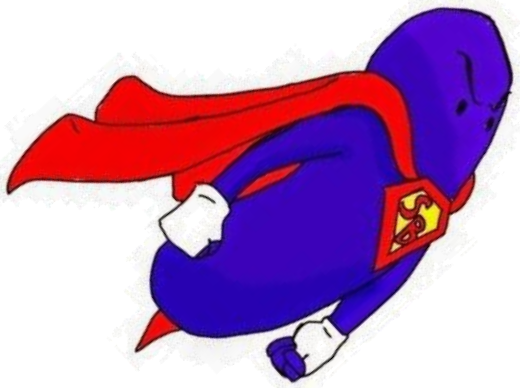
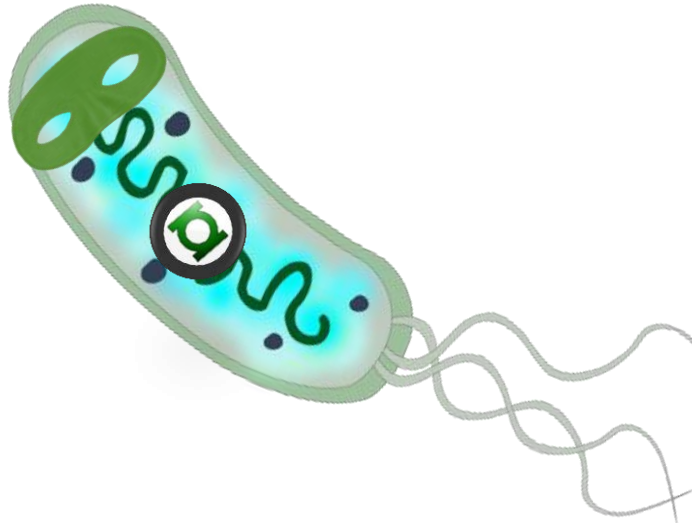




Obrigada pela vossa atenção



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Linking life and technology to shape the future

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